attention at the present moment were:—(1) The union or co-ordination of the work of the Board of Education and the Board of Agriculture in dealing with agricultural and rural instruction; and (2) the training of teachers in nature knowledge and other rural subjects. Speaking upon the first of these subjects, Mr. Hobhouse, M.P., said the Board of A riculture only inspected certain of the higher agricultural schools, and did not systematically advise or report on the work of the local authorities. It had no voice in drawing up schemes for agricultural instruction for which grants were given under the Directory or Code. It thus failed to take the position assumed by the agricultural departments of nearly every other country, including Ireland and our own colonies, where the progress of agriculture was systematically promoted by encouraging the best methods of instruction. The yearly sum devoted to agricultural instruction and research in the United States was (federal grants only) 700,000*l.*; in Canada, 156,000*l.*; in France, 152,460*l.*; and in Würtemberg, 65,000*l.*; while in England the sum was only about 15,000*l.* It would seem that the example of Scotland should be followed in England, and that the educational powers of the Board of Agriculture should be transferred to the Board of Education, especially as under the Board of Education Act, 1899, there already existed power to make a similar transfer by Order in Council. The Board of Agriculture would then, much to its own relief, cease to be an educational authority, though it might, perhaps, retain some supervision over certain experimental work carried on by agricultural societies.

SCIENTIFIC SERIALS.

American Journal of Science, April.—The magnetic theory of the solar corona, by F. H. Bigelow. A discussion of an experiment of Ebert on the behaviour of an electrified sphere in a magnetic field, when placed in a rarefied gas. The phenomena observed in the corona of the sun agree in a remarkable way with the effects produced in the above experiment.—Tertiary springs of Western Kansas and Oklahoma, by C. N. Gould.—Some fundamental propositions in the theory of elasticity. A study of primary or self-balancing stresses, by F. H. Cilley. A discussion of the effects of initial or "primary" strain of a body upon its elasticity. Since these strains and stresses are a component of the actual strains and stresses existing in substances, it is concluded that the latter cannot be defined through the equations of elasticity alone.—The boiling point of liquid hydrogen determined by the hydrogen and helium gas thermometers, by T. Dewar. From the *Proceedings* of the Royal Society.—On the nature of vowels, by E. W. Scripture. Reproductions of a magnified set of curves from a gramophone. The results tend to show that the movement of the air in the mouth cavity is a free vibration and not a forced one. The cord movements in the vowels are of the nature of explosive openings and not of the usual vibratory form found in most musical instruments.—Note on the behaviour of the phosphorus emanation in spherical condensers, by C. Barus.—The remarkable concretions of Ottawa County, Kansas, by W. T. Bell.

Annalen der Physik, April 1.—The application of the method of residual rays to the proof of the law of radiation, by H. Rubens and F. Kurlbaum. A discussion of the various expressions which have been proposed to show the relations between the intensity of radiation, the wave length and the temperature. A detailed account of the experimental methods is given, measurements being carried out at temperatures between −180° C. and 1450° C., a graphical comparison being given between the experimental results and those calculated from the formulæ proposed by Wien, Thiesen, Rayleigh and Planck. The simple formula of Planck would appear to be the best hitherto proposed.—The elementary laws of electrodynamics, by E. Wiechert.—On the absorption of heat by carbonic acid, by S. Arrhenius. An account of the results of measurements of the absorptive capacity for heat of carbonic acid. The results are applied to the discussion of the effects of carbonic acid in the atmosphere upon the temperature of the air.—On the surface tension of water surfaces covered with an oil layer, and on the range of molecular action, by R. H. Weber. The value deduced from the experiments for the radius of molecular action is 115 $\mu\mu$., considerably greater than that deduced from the experiments of Reinold and Rucker, 10 to 17 $\mu\mu$.—On the phenomena in induction coils, by K. R. Johnson.—Mechanical vibrations of an isolated stretched wire with visible electrical discharges, by O. Viol. If an isolated stretched wire is charged from one end with electricity at high potential, transverse vibrations are set up in the wire, and if the electricity is negative and the charge sufficiently high for a visible discharge to take place along the wire, only the nodes appear to shine.—On the mode of action of coherers, by K. E. Guthe.—Contribution to the knowledge of the thermomagnetic longitudinal effect, by L. Lownds.—On the band spectra of alumina and nitrogen, by G. Berndt.—On the change of the absorption of light in solid bodies with the temperature, by J. Kœnigsberger.—On the influence of a resistance free from self-induction on the oscillatory discharge of a condenser, by T. Mizuno.—The air barometer, by H. A. Naber.—On the spectrum equation of polished platinum, by D. A. Goldhammer.—On the pressure of light rays, by D. A. Goldhammer.—On the magnetism of iron, by C. Fromme.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, March 21.—Prof. Thorpe, president, in the chair.—The following papers were read:—Researches on morphine, part ii., by S. B. Schryver and F. H. Lees. The authors have previously shown that bromomorphide is decomposed by water with formation of isomorphine, a base isomeric with morphine; it is now shown that another isomeride, β-isomorphine, is also produced in small quantity. Phosphorus trichloride converts codeine into chlorocodeide, which corresponds with bromomorphide and is convertible into isocodeine, a base isomeric with codeine.—The constitution of pilocarpine, part ii., by H. A. D. Jowett. Bromine acts upon isopilocarpine with formation of dibromoisopilocarpine perbromide and small quantities of monobromoisopilocarpine and isopilocarpinic acid; the latter is an oil of the composition $C_{11}H_{16}O_4N_2$. On oxidising dibromoisopilocarpine with permanganate, pilopinic acid, $C_8H_{11}O_4N$, and pilopic acid, $C_7H_{10}O_4$, are obtained. At 100°, in presence of water, bromine acts on isopilocarpine with production of dibromoisopilocarpinic, monobromoisopilocarpinic, bromopilopinic and bromopilopic acids.—The chemical action of *Bacillus coli communis* and similar organisms on carbohydrates and allied compounds, by A. Harden. The author has examined the products of the action of *B. coli communis* and *B. typhosus* on carbohydrates, and notes that the production of alcohol by the former organism appears to depend on the presence of the group $CH_2(OH)\cdot CH.OH$ in the compound to be fermented.—Action of dry silver oxide and ethyl iodide on benzoylacetic ester, deoxybenzoin and benzyl cyanide, by G. D. Lander.—Alkylation of acylarylamines, by G. D. Lander. Dry silver oxide and ethyl iodide convert the acylarylamines into the imino-ether, whilst if methyl iodide is substituted for ethyl iodide, a mixture of the imino-ether and the acylalkylamine usually results.—The preparation of aliphatic imino-ethers from amides, by G. D. Lander.—Note on the latent heats of evaporation of liquids, by H. Crompton.—On the atomic weight of lanthanum and on the error of the "sulphate method" for the determination of the "equivalent" of the rare earths, by B. Brauner and F. Pavlíček. It is shown that in the conversion of lanthanum oxide into sulphate for atomic weight determinations, small quantities of acid sulphate are produced and cause error in the determination of the equivalent; it is further shown that lanthanum, as hitherto known, is a mixture of two earth metals in which the true lanthanum of atomic weight 139·0 predominates.—On the atomic weight of praseodymium, by B. Brauner. The author has determined the atomic weight of praseodymium by four methods and made ebullioscopic determinations with the chloride in alcohol solutions; the final atomic weight of praseodymium is given as 140·94.—On praseodymium tetroxide and peroxide, by B. Brauner. Praseodymium tetroxide, Pr_2O_4, is obtained as a black powder, by fusing the nitrate with nitre and on treating praseodymium nitrate with hydrogen peroxide the hydrate of praseodymium peroxide, Pr_2O_5, is produced.—Note on neodymium, by B. Brauner. The number 143·5 was found by the sulphate method for the atomic weight of neodymium; this metal gives a tetroxide, Nd_2O_4, and a peroxide, Nd_2O_5.—Contribution to the chemistry of thorium, by B. Brauner. The author concludes that thorium does not consist of a single element because on fractional hydrolysis of ammonium thorium oxalate, fractions are obtained in which the

atomic weight of the metal varies from 220 to 232.—Pheno-α-ketoheptamethylene and its derivatives, by F. S. Kipping and A. E. Hunter. Pheno-α-ketoheptamethylene is obtained by the action of aluminium chloride on phenylvaleric chloride; its oxime is reducible to pheno-α-aminoheptamethylene,

$$C_6H_4\begin{cases}CH_2.CH_2.CH_2\\ \quad\quad\quad\quad|\\ CH(NH_2).CH_2\end{cases}.$$

—Note on diphenyldinitroethylene, by J. J. Sudborough.—Para- and ortho-cyanohydroxy-derivatives of pyridine, by J. Moir.

Geological Society, April 3.—Mr. Horace W. Monckton, vice-president, in the chair.—The igneous rocks and associated sedimentary beds of the Tortworth inlier, by Prof. C. Lloyd Morgan, F.R.S. and Mr. S. H. Reynolds. It has long been known that igneous rocks occur in the district under consideration, but opinions are divided as to their intrusive or contemporaneous character. Evidence is here brought forward to show that the igneous rocks form two bands, the lower interbedded with Upper Llandovery strata, and the upper overlain by Wenlock, and that both bands are probably contemporaneous lavas. The microscopic examination of the lower igneous rock shows that it is a basaltic andesite containing plagioclase (acid andesine or oligoclase), pseudomorphs after enstatite, with chloritic and iron-oxide patches. The higher bed sometimes contains fresh augite, and both bands frequently contain rounded grains of quartz. In other examples the felspars appear in three forms, with augite and enstatite, and the rock ranges from an andesite to a porphyritic basalt. The quartz-grains present appear to be xenoliths. The silica-percentage of the rocks on a moisture-free basis varies from 61 to 67, while the specific gravities are from 2·74 to 2·99.

Linnean Society, April 4.—Mr. C. B. Clarke, F.R.S., vice-president, in the chair.—The secretary exhibited some British species of plants forwarded by M. Buysman, of Middelburg, to show the character of a proposed issue to include the whole of the British flora, on which some remarks were made by the chairman and Mr. James Groves.—Mr. W. B. Hemsley, F.R.S., exhibited specimens of Sapium and Hevea (Euphorbiaceæ) and Castilloa (Artocarpaceæ), with a view to clear up certain questions concerning the rubber-trees, by examining a large series of plants and seeds forwarded by Mr. Jenman, Government botanist in British Guiana. The genus Hevea included ten or a dozen described species inhabiting eastern tropical South America, but none in the West Indies. *Hevea brasiliensis*, the source of the true Pará rubber, was not very different from *Hevea guianensis*, which is restricted to French Guiana, the differences between them being shown in the figures given of the floral structure and seeds in Hooker's *Icones Plantarum*, plates 2570-2577. It was formerly supposed that two species of Hevea might be distinguished in British Guiana, one (*Hevea pauciflora*) having thin leaves and a hairy ovary, the other thick coriaceous leaves and a glabrous ovary; but after examining a large number of specimens, Mr. Hemsley had come to the conclusion that the differences were not constant, and that all the specimens exhibited might belong to one species, and merely represented individual variation. The exhibition demonstrated the difficulty of determining species of Hevea from imperfect specimens, and especially from seeds alone.—A paper was read by Messrs. W. B. Hemsley and H. H. Pearson on a small collection of dried plants made by Sir Martin Conway in the Bolivian Andes in 1898-99. This collection contained but forty-six species, but these were of special interest from the great height at which they were found, *i.e.* between 18,000 feet and 18,700 feet above sea-level. The highest Andine plants on record were stated to be *Malvastrum flabellatum*, Wedd., and a grass, *Deyeuxia glacialis*, Wedd.—A paper was read by Mr. G. S. West on some British freshwater Rhizopods and Heliozoa. When collecting freshwater algæ in different parts of the country the author had found Rhizopods and Heliozoa in abundance, and had preserved them for future examination. The observations now made related to their habits and structure, and comprised descriptions of peculiar forms of some of the commoner types, as well as remarks on several little-known species. Half a dozen species were described as new, and one (*Leptochlamys ampullacea*) was referred to a new genus. Two points of special interest were (1) the presence of a perforation at the apex of the shell in some forms of *Difflugia acuminata*, the shell thus possessing two openings: and (2) the possession of certain characters by members of the genus Vampyrella which sharply demarcate them from other Rhizopods. In the latter case, Mr. West had been able to observe several of these minute creatures feeding on the cell-contents of a species of Mougeotia.

Mathematical Society, Thursday, April 11.—Dr. Hobson, F.R.S., president, in the chair.—Mr. A. B. Basset, F.R.S., made a brief communication on the projective properties of cubic and quartic curves. Prof. Love, F.R.S., also made a few remarks on the communication.—A paper by Dr. F. Morley, entitled "Summation of the Series

$$\sum_{n=0}^{\infty}\Gamma^3(a+n)/\Gamma^3(1+n),"$$

was communicated by its title.—Lieut.-Colonel Cunningham, R.E., announced the factorisation of the algebraic prime factors of $5^{75}-1$ and of $5^{105}-1$.
The first =

151.3301. 183794551. 9924441445950l,

and the second =

2122678325021436l. 207468970805907721.

He has not determined the composition of the three large factors.

Zoological Society, April 16.—Mr. Howard Saunders, vice-president, in the chair.—A communication was read from Mr. W. L. Distant entitled, "A Revision of the Insects of the Order Rhynchota belonging to the Family Coreidæ in the Hope collection at Oxford." It was stated to be supplementary to the paper on the same subject already published in the *Proceedings* (*cf.* P.Z.S. 1900, p. 807)—Mr. F. E. Beddard, F.R.S., read a series of notes on earthworms, which comprised (1) an account of some earthworms from eastern tropical Africa in the collection of the British Museum; (2) a note on the spermatophores of *Polytoreutus*; (3) a note on the spermatophores of *Stuhlmannia*; (4) remarks on the ovaries, oviducts and spermducts of *Stuhlmannia*; and (5) a contribution to our knowledge of the genus *Gordiodrilus*.—Mr. F. E. Beddard also read a paper on the anatomy and systematic position of the open-billed stork (*Anastomus oscitans*), based on an examination of a specimen of this bird that had died in the Society's gardens. The author was of opinion that the structural differences between *Anastomus* and the typical storks were so slight that they did not warrant the placing of this bird in a separate family or subfamily.—A paper was read from Dr. H. Lyster Jameson giving an account of the mother-of-pearl oysters (*Margaritiferae*). It was based upon a study of the series of these oysters in the British Museum and upon an examination of a large series of marketable mother-of-pearl oysters of various species in the London shell-warehouses, and dealt with the specific identity, geographical distribution, local variation, original name and synonymy of the different members of *Margaritifera*. The subgenus was divided into two sections, characterised respectively by the absence or presence of rudimentary hinge-teeth. Several new species and local forms were described in this paper.—A communication from Miss Emily M. Sharpe contained a list of the Lepidoptera collected by Mr. Ewart S. Grogan during his expedition from the Cape to Cairo. The names of sixty-six species represented in the collection were enumerated in the paper. Two of these were described as new under the names *Amauris grogani* and *Gnophodes grogani*.

Royal Astronomical Society, April 12.—Prof. Turner read a paper by Mr. H. C. Plummer on a method for mechanically compensating the rotation of the field of a siderostat. Prof. Turner had in a previous paper given the principle of several methods by which this might be effected, but Mr. Plummer's appeared a still simpler arrangement. Prof. Turner gave an account of his own paper—Tables and Formulæ for connecting the Co-ordinates of Stars on different Photographic Plates—particularly in connection with the Astrographic Chart of the Heavens.—Mr. Bryant read a further investigation on the "two method" personal equation, in which he brought forward many interesting points in connection with the changes in the personal equation of three different observers at the Royal Observatory, Greenwich.—Mr. McClean read a paper on the spectrum of Nova Persei, and showed photographs, in which its spectrum was compared with those of η Argûs and Nova Normæ. Father

Sidgreaves had sent a communication in which the Nova was considered as a variable star with a variable spectrum.—Mr. Whittaker read some observations by Mr. Sharp of the changes of brightness in the Nova, and Dr. Rambaut read the observations made at the Radcliffe Observatory, Oxford It appeared from these that while the light of the new star was steadily diminishing there had been fluctuations of brightness to the extent of about a magnitude and a half. Minima had been observed on March 22, 25, 28, 31, also on April 3 and 6. The latter minimum was prolonged to April 7, after which the light increased, and again diminished.—Papers by Mr. Innes on anomalous occultations of stars by the moon, and by Mr. Denning on meteoric showers from the region between α and β Persei were also read.

PARIS.

Academy of Sciences, April 15.—M. Fouqué in the chair.—New researches on the action of hydrogen peroxide upon silver oxide, by M. Berthelot. The action of hydrogen peroxide upon silver oxide is regarded by the author as first resulting in the formation of an unstable silver peroxide, which then decomposes in two ways, partly into silver and oxygen, and partly enters into combination with some of the unchanged silver oxide present, giving an oxide Ag_4O_3.—On the representative power of a finite portion of a continuous curve, by M. G. Lippmann.—On the decomposition of meromorphic functions into simple elements, by M. Émile Borel.—On the roots of transcendental equations, by M. Edmond Maillet.—On the continued fraction of Stieltjes, by M. H. Padé.—On groups of operations, by M. G. A. Miller.—Action of the radium radiation upon selenium, by M. Eugène Bloch. A selenium cell submitted to the action of the radium rays undergoes a diminution of resistance of the same character as that produced by light or by the Röntgen rays, except that the effect is more slowly produced and that its magnitude is smaller. These experiments form an argument in favour of the idea that the radium rays are formed of a complex of kathode rays and of Röntgen rays.—Disruptive discharge in electrolytes, by MM. André Broca and Turchini. It is shown that the conductivity of electrolytes requires a certain time for its establishment, and that for sufficiently high frequencies electrolytes are pure dielectrics. This is in accordance with the requirements of the electro-magnetic theory of light.—On oscillating sparks, by M. G. A. Hemsalech.—The detection of alkaloids by the micro-chemical method, by M. E. Pozzi-Escot. The use of picric acid as a micro-chemical reagent for alkaloids, suggested by M. Popoff, is not found to form a trustworthy method, the only really characteristic crystals being given by strychnine.—On the flora of mosses in caverns, by MM. L. Géneau de Lamarlière and J. Maheu.—On the rational pruning of ligneous plants, by M. F. Kövessi.—On the probable existence of a recent sea in the region of Timbuctoo, by M. Aug. Chevalier.

DIARY OF SOCIETIES.

THURSDAY, APRIL 25.

ROYAL INSTITUTION, at 3.—Naturalism in Italian Painting: Roger Fry.
INSTITUTION OF CIVIL ENGINEERS, at 8.—"James Forrest" Lecture—On Chemistry in its Relations to Engineering: Prof. Frank Clowes.

FRIDAY, APRIL 26.

ROYAL INSTITUTION, at 9.—Colour in the Amphibia: Dr. Hans Gadow, F.R.S.
SOCIETY OF ARTS, at 8.—Polyphase Electric Working: Alfred C. Eborall.
PHYSICAL SOCIETY, at 5.—On the Thermodynamical Correction of the Gas Thermometer: Prof. Callendar, F.R.S.—On the Production of a Bright-line Spectrum by Anomalous Dispersion and its Application to the Flash-Spectrum: Prof. R. W. Wood.
INSTITUTION OF CIVIL ENGINEERS, at 4.—Repetition of "James Forrest" Lecture—On Chemistry in its Relations to Engineering: Prof. F. Clowes.

SATURDAY, APRIL 27.

ROYAL INSTITUTION, at 3.—Climate: its Causes and its Effects: J. Y. Buchanan, F.R.S.

MONDAY, APRIL 29.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Travels in Central Kurdistan: Major F. R. Maunsell.
SOCIETY OF ARTS, at 8.—Alloys: Sir W. C. Roberts-Austen, K.C.B., F.R.S.
INSTITUTE OF ACTUARIES, at 5.30.—On the Valuation of Staff Pension Funds: H. W. Manly. With Tables and Examples by E. C. Thomas.

TUESDAY, APRIL 30.

ROYAL INSTITUTION, at 3.—Cellular Physiology: Dr. A. Macfadyen.
SOCIETY OF ARTS, at 4.30.—The British West Indies: Sir Nevile Lubbock, K.C.M.G.
INSTITUTION OF CIVIL ENGINEERS, at 8.—Annual General Meeting.

WEDNESDAY, MAY 1.

SOCIETY OF ARTS, at 8.—The Thames Steamboat Service: Arnold F Hills.
ENTOMOLOGICAL SOCIETY, at 8.—The Metamorphoses of *Æschna cyanea*, illustrated by Photographs taken from Life: Frederick Enock.—The Classification of a New family of the Lepidoptera: Sir George F. Hampson, Bart.
SOCIETY OF PUBLIC ANALYSTS, at 8.—Alkaline Waters from the Chalk: W. W. Fisher.—Citron Oil: Herbert E. Burgess.—Arsenic in Coal and Coke: Alfred C. Chapman.

THURSDAY, MAY 2.

ROYAL SOCIETY, at 4.30.
LINNEAN SOCIETY, at 8.—Studies in Heterogenesis: Prof. H. C. Bastian, F.R.S.
CHEMICAL SOCIETY, at 8.—The Synthetical Formation of Bridged-Rings Part I. Some Derivatives of Bicyclopentane: Prof W. H. Perkin, jun., F.R.S., and Dr J. F. Thorpe.—Ballot for the Election of Fellows.
INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—An Instrument for Measuring the Permeability of Iron and Steel: C. G. Lamb and Miles Walker.—A Watt-Hour Meter: Frank Holden.

FRIDAY, MAY 3

ROYAL INSTITUTION, at 9.—Memory: C. Mercier.
SOCIETY OF ARTS, at 8.—Polyphase Electric Working: A. C. Eborall.
ANATOMICAL SOCIETY, at 4.—(*a*) Additional Notes on the Articulations between the Occipital Bone, Atlas, and Axis in the Mammalia: (*b*) On the Development of Digits in Cetacea; (*c*) Observations on the Development of the Human Brain before and after Birth: Prof. Symington.—A Contribution to the Study of the Morphology of Adipose Tissue: Dr. H. Batty Shaw.—A Lantern Demonstration showing the Origin and Nature of the Hydatiform Bodies of the Testicle and Broad Ligament, with Special Reference to the Fate of the Mullerian Duct in the Epididymis: J. H. Watson.—Relation of Structure to Function, as illustrated by the Growth of the Inferior Femoral Epiphysis: Prof. Arthur Thomson.

SATURDAY, MAY 4.

ROYAL INSTITUTION, at 3.—Climate: its Causes and its Effects: J. Y. Buchanan, F.R.S.

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